Collis, Inc. – Corrective Measures Study
FINAL CMI - LTM Groundwater Monitoring Work Plan

Report Date: August 30, 2017

Ms. Andrea Stone
Project Coordinator
United States Environmental Protection Agency – Region VII (AWMD/WRAP)
11201 Renner Boulevard
Lenexa, KS 66219

Site Name: Collis, Inc.
Clinton, Iowa
Long Term Monitoring
U.S. EPA ID #IAD047303771

RCRA
566432

Prepared by: Jim Colmer, PE, BB&E, INC

BB&E, INC (BB&E) is pleased to provide this Corrective Measures Implementation (CMI) – Long Term Groundwater Monitoring Work Plan (LTM WP). The Draft Corrective Measures Study Report, dated June 30, 2017, included proposed recommendations for LTM groundwater monitoring including semi-annual groundwater monitoring for five years. Following the five years of semi-annual sampling, an evaluation will be conducted to determine the effectiveness of the planned monitored natural attenuation (MNA) groundwater remedy. The evaluation results, with recommendations, will be submitted to EPA for review, modifications to the semi-annual schedule, and/or approval. The semi-annual LTM sampling and analysis will be conducted in accordance with the approved Quality Assurance Project Plan (QAPP) (BB&E, September 2016).

LTM GROUNDWATER AND STAFF GAUGE ELEVATIONS

During each semi-annual LTM groundwater monitoring event, continued collection of static water level measurements from the remaining piezometers and monitoring wells not sampled will occur, except certain wells designated as minimally contributing to the determination of the interface of groundwater with Manufacturer's Ditch. Static water levels will continue to be collected from the thirty-nine (39) monitoring wells/piezometers listed in Table 1 as well as any newly installed monitoring wells (if necessary). Further monitoring of the staff gauges will not be completed in accordance with a conference call held on February 5, 2015, between U.S. EPA and Collis, when it was determined that continued monitoring of the staff gauges is no longer necessary. Although surface water elevations will not be collected, the surface water elevation relevant to site groundwater elevations will be evaluated by measurement of groundwater elevations on both the north and south sides of the ditch, and determination of whether shallow groundwater from the site is discharging to the ditch.

LTM GROUNDWATER MONITORING

The following sections are broken down by saturated unit. Laboratory methodologies for sample analysis are provided in the approved QAPP. Procedures for groundwater sampling are also included in Section 4.4 of the approved QAPP.

Table 1 and Figure 1 show the wells that are to be included in the LTM Groundwater Monitoring. Table 2 includes construction details of the site monitoring wells.

VOCs - First Saturated Groundwater Unit:

Monitoring wells MW-38, MW-39, MW-50S, PZ-47 and PZ-48 will be sampled on a semi-annual basis for five years and analyzed for VOCs (U.S. EPA Method 8260).

VOCs - Second Saturated Groundwater Unit (Upper Unit):

In the second saturated groundwater unit (upper consolidated sediments and weathered bedrock), MW-34, MW-45, MW-47S, MW-50, and MW-56 will be sampled on a semi-annual basis for five years and analyzed for VOCs (U.S. EPA Method 8260).

VOCs - Third Saturated Groundwater Unit (Lower Unit):

In the third saturated groundwater unit (lower consolidated sediments and upper bedrock), MW-42 and MW-53 will be sampled on a semi-annual basis for five years and analyzed for VOCs (U.S. EPA Method 8260).

VOCs - Fourth Saturated Groundwater Unit:

In the fourth saturated groundwater unit (bedrock), MW-43 will be sampled on a semi-annual basis for five years for VOCs (U.S. EPA Method 8260).

Monitored Natural Attenuation Parameters

Monitored natural attenuation (MNA) monitoring will also continue from the key monitoring wells MW34 (second saturated unit), MW42, and MW53 (third saturated unit) including analyses and evaluation for the following groundwater parameters: chloride, nitrate/nitrite, sulfate/sulfide, dissolved iron, dissolved manganese, methane, ethane, and ethene (dissolved hydrocarbons). These MNA parameters were selected in order to evaluate the on-going effectiveness of MNA at the site in accordance with the U.S. EPA and Interstate Technology Regulatory Cooperation (ITRC) guidance including the *Natural Attenuation of Chlorinated Solvents in Groundwater: Principles and Practices (September 1999).* A summary of key MNA parameters is provided below:

chloride	• provides evidence of dechlorination, • serves as a possible use in mass balancing • may also serve as a conservative tracer

nitrate/nitrite	• nitrate compounds are used as an electron acceptor by denitrifying bacteria or is converted to ammonia for assimilation • nitrite is produced from nitrate under anaerobic conditions
sulfate/sulfide	• changes in the sulfate concentration may provide evidence of activities of sulfate reducing bacteria • sulfide may provide evidence of a sulfate reduction.
dissolved iron	• iron in ferrous (soluble reduced) form indicates activity of iron reducing bacteria • iron in ferric (oxidized) form is used as an electron acceptor
dissolved manganese	• manganese is an indicator of iron and manganese reducing conditions
methane, ethane, and ethene	• provide evidence of complete dechlorination of chlorinated methanes, ethanes, and ethenes • methane also indicates activity of methanogenic bacteria

As shown on Table 1, the well targeted in the second saturated unit is MW-34 due to previous chlorinated volatile organic compound (CVOC) detections; and in the third saturated unit, MW-42 and MW-53 due to previous CVOC detections.

1,4-Dioxane Sampling

Monitoring wells MW-34, MW-42, MW-45, and MW-53 will be sampled and analyzed for 1,4-Dioxane on a semi-annual basis for five years. Laboratory analyses will be conducted per EPA Method 8260B SIM.

Field Parameters

Field parameters, including oxygen reduction potential, dissolved oxygen, specific conductivity, and pH, will be collected from all wells sampled during the CMI - LTM Groundwater Monitoring semi-annual events to determine when to sample a well and enhance the dataset for evaluation of MNA effectiveness in accordance with the ITRC Technical Regulatory Guidelines Natural Attenuation of Chlorinated Solvents in Groundwater: Principles and Practices (September 1999). These parameters will be recorded on groundwater sampling field forms.

Decontamination

The approved QAPP describes the decontamination process using Alconox or other phosphate free detergent. Dedicated sampling materials will be used as much as possible to reduce the need for decontamination activities. However, when decontamination activities are necessary, they will be executed with care to ensure that sampling equipment is rinsed thoroughly. Field equipment and soil boring equipment decontamination will be conducted in accordance with Section 4.8 of the

approved QAPP. To ensure proper decontamination procedures are conducted, field equipment rinsate blanks will be collected in accordance with Section 4.6 of the approved QAPP.

Investigation-Derived Waste Management

Since only groundwater samples are to be collected, little if any investigation-derived waste (IDW) will be generated. All purge water generated will be disposed of directly at the waste water treatment plant inside the Collis Facility. All sampling gloves and other personal protective equipment will be double-bagged and placed in an on-site municipal waste container for disposal.

LTM Groundwater Monitoring Reports

Upon completion of each of the semi-annual sampling events, a brief summary letter report will be prepared to document the sampling activities and results of that specific event. Analytical results will be compared with the U.S. EPA Regional Screening Levels (RSLs), latest edition. In addition to the RSL comparison, shallow groundwater analytical results for VOCs will be compared to target groundwater concentrations for vapor intrusion screening levels (VISLs). VOC results for the first and second saturated units only will be compared to VISL target groundwater concentrations, calculated using the U.S. EPA VISL Calculator (version 3.5.1, last updated July 11, 2016). Results of the sampling will be discussed in consultation with the U.S. EPA and Collis. In addition, the summary report will include a figure documenting all sample locations, survey coordinates of all sample points, and final laboratory analytical reports. Potentiometric surface maps with groundwater flow directions indicated will be created for the first three saturated groundwater units. Concentration trend graphs will also be provided for key monitoring wells documenting long-term contaminant trends of the primary COCs. An assessment of on-going MNA will also be provided.

Schedule

Collis will provide the EPA with a 10 day advanced notice prior to commencing a sampling event. Semi-annual groundwater sampling events will be conducted as follows:

	First Half (March/April)	Second Half (September/October)
Year 1 (2018)	X	X
Year 2 (2019)	X	X
Year 3 (2020)	X	X
Year 4 (2021)	X	X
Year 5 (2022)	X	X

During the review of this CMI - LTM WP, should you have any questions or comments, I would be happy to answer them. Please do not hesitate to contact me at (248) 489-9636 ext. 309.

Sincerely,

Jim Colmer, PE
Project Manager
BB&E, INC

cc: Mr. Brian Calhoun – Collis/SSW
Mr. Charlie Denton – Barnes & Thornburg, LLP

Enclosed:
Figure 1 – LTM Monitoring Well Locations
Table 1 – LTM Groundwater Monitoring Program
Table 2 – Monitoring Well Construction Detail

File Path: H:\jobs\SSW\Collis, IA\2017 LTM WP\Final LTM WP\FINAL - LTM WP-08-30-17.docx
Date: 8/30/2017 1:32:41 PM
Author/Reviewer: KVB/TEB/CML

FIGURES

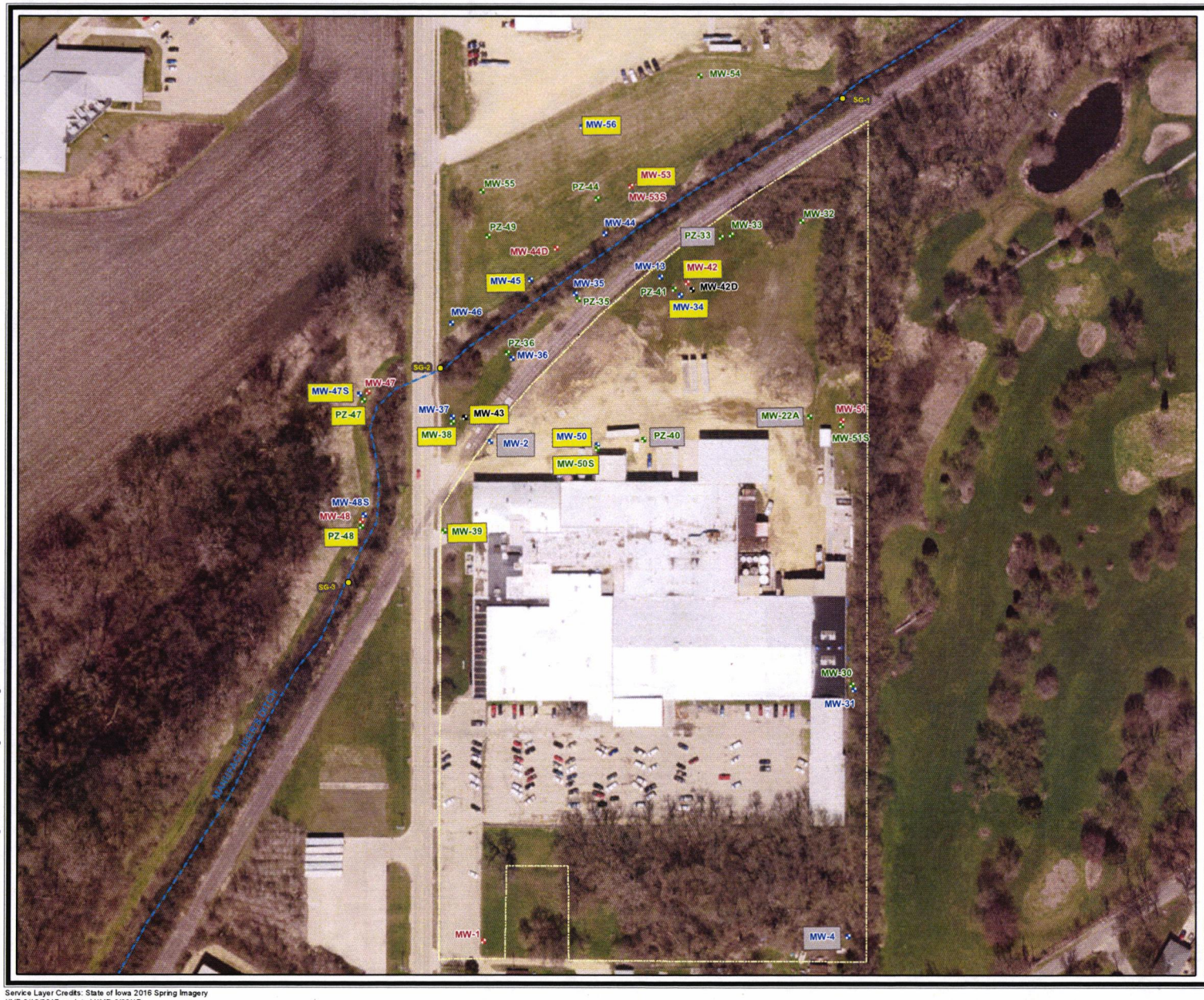

Figure 1

LTM Monitoring Well Locations

Collis, Inc. Manufacturing Facility
Clinton, Iowa

Legend:

- Staff Gauge Location
- Manufacturer's Ditch
- Property Boundary (Approximate)

Monitoring Wells

- First Saturated Unit
- Second Saturated Unit
- Third Saturated Unit
- Fourth Saturated Unit
- LTM Monitoring Well
- Wells Not Included In LTM

Note:
LTM = long term monitoring

NORTH

0 250 500

Feet

BB&E

Document Path: H:\ITGIS\SSW\Collis\figures\LTM GW Monitoring Work Plan\Figure 1 - Site Features.mxd

Service Layer Credits: State of Iowa 2016 Spring Imagery
KVB 8/10/2017, updated KMD 8/29/17

TABLES

Table 1
LTM Groundwater Monitoring Program
LTM Groundwater Monitoring
SSW Collis, Clinton Iowa

First Saturated Groundwater Unit[1]								
	First Semi-Annual Sampling Event				Second Semi-Annual Sampling Event			
Well	SWL	VOCs	MNA	1,4-Dioxane	SWL	VOCs	MNA	1,4-Dioxane
MW-30	X				X			
MW-32	X				X			
MW-33	X				X			
MW-38	X	X			X	X		
MW-39	X	X			X	X		
MW-50S	X	X			X	X		
MW-51S	X				X			
PZ-35	X				X			
PZ-36	X				X			
PZ-41	X				X			
PZ-44	X				X			
PZ-47	X	X			X	X		
PZ-48	X	X			X	X		
PZ-49	X				X			
MW-54	X				X			
MW-55	X				X			

Second Saturated Groundwater Unit[2]								
	First Semi-Annual Sampling Event				Second Semi-Annual Sampling Event			
Well	SWL	VOCs	MNA[5]	1,4-Dioxane	SWL	VOCs	MNA[5]	1,4-Dioxane
MW-13	X				X			
MW-31	X				X			
MW-34	X	X	X	X	X	X	X	X
MW-35	X				X			
MW-36	X				X			
MW-37	X				X			
MW-44	X				X			
MW-45	X	X		X	X	X		X
MW-46	X				X			
MW-47S	X	X			X	X		
MW-48S	X				X			
MW-50	X	X			X	X		
MW-56	X	X			X	X		

Third Saturated Groundwater Unit[3]								
	First Semi-Annual Sampling Event				Second Semi-Annual Sampling Event			
Well	SWL	VOCs	MNA[5]	1,4-Dioxane	SWL	VOCs	MNA[5]	1,4-Dioxane
MW-1	X				X			
MW-42	X	X	X	X	X	X	X	X
MW-44D	X				X			
MW-47	X				X			
MW-48	X				X			
MW-51	X				X			
MW-53	X	X	X	X	X	X	X	X
MW-53S	X				X			

Fourth Saturated Groundwater Unit[4]								
	First Semi-Annual Sampling Event				Second Semi-Annual Sampling Event			
Well	SWL	VOCs	MNA	1,4-Dioxane	SWL	VOCs	MNA	1,4-Dioxane
MW-42D	X				X			
MW-43	X	X			X	X		

Notes:

CMI = Corrective Measures Implementation

LTM = Long Term Monitoring

MW = Monitoring Well

SWL = Static Water Level

VOC = Volatile Organic Compound

All USEPA test methods are detailed in the approved QAPP (BB&E, September 2016)

Field parameters (ORP, DO, conductivity, and pH) will be collected from all wells sampled during the semi-annual events

Sampling will be conducted for 5 consecutive years.

[1] First Saturated Unit is comprised of surficial soils

[2] Second Saturated Unit is comprised of upper consolidated sediments and weathered bedrock

[3] Third Saturated Unit is comprised of lower consolidated sediments and upper bedrock

[4] Fourth Saturated Unit is comprised of bedrock

[5] MNA (Monitored Natural Attenuation) Parameters include: chloride, nitrate/nitrite, sulfate/sulfide, dissolved iron, dissolved manganese, methane, ethane, and ethene.

TABLE 2
MONITORING WELL CONSTRUCTION DETAILS
LTM GROUNDWATER MONITORING
COLLIS, INC., CLINTON, IOWA

Well ID	TOC ELEVATION (ft amsl)	Constructed Well Depth (ft bgs)	Nominal Screen Interval (ft bgs)
MW-1	590.30	70.56	59.4-69.4
MW-13	590.96	22.59	10-20
MW-30	590.51	14.5	10-15
MW-31	590.55	25.8	21-26
MW-32	588.47	16.28	9-14
MW-33	587.73	17.35	9.5-15.5
MW-34	589.29	31.6	25-30
MW-35	585.82	18.91	11-16
MW-36*	583.34	14.55	10-15
MW-37	585.27	17.93	13-18
MW-38	585.47	9.95	5-10
MW-39	587.47	13.91	9-14
MW-42	589.25	50.2	42-47
MW-42D	589.49	97.97	90-95
MW-43*	585.21	99.38	94.75-99.75
MW-44*	582.40	31.71	24-29
MW-44D*	582.57	48.89	41-46
MW-45*	582.41	25.59	19-24
MW-46*	582.68	37.65	30-35
MW-47*	583.34	51.49	45-50
MW-47S*	583.17	17.93	13-18
MW-48*	584.21	35.51	30-35
MW-48S*	584.24	18.64	14-19
MW-50	587.27	24.77	20-25
MW-50S	587.51	12.28	7.5-12.5
MW-51	587.28	49.18	44-49
MW-51S	587.21	11.16	7-12
MW-53*	582.73	52.24	45-50
MW-53S*	582.77	37.99	31-36
MW-54*	582.31	15	10-15
MW-55	582.41	15	10-15
MW-56	582.33	30	25-30
PZ-35	585.07	13.39	1-10
PZ-36	582.64	10.79	1-11
PZ-41	588.98	15.22	10-15
PZ-44	582.71	11.79	2-12
PZ-47	583.17	10.89	1-11
PZ-48	584.27	10.65	1-11
PZ-49*	582.66	11.45	2-12
SG-1	580.80	NA	NA
SG-2	581.26	NA	NA
SG-3	580.92	NA	NA

Notes:

* Artesian conditions identified

NA - Not available

DTW - Depth to water

TOC - Top of casing

ft bgs - feet below ground surface

ft amsl - feet above mean sea level

SG-1, SG-2, and SG-3 are staff gauges located in Manufacturer's Ditch.